Decision Rationale

Total Maximum Daily Loads for
Fecal Coliform for Blacks Run, Accotink Creek, and Christians Creek

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those water bodies identified as impaired by a state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS), that may be discharged to a water quality-limited water body.

This document will set forth the Environmental Protection Agency's (EPA) rationale for approving the TMDLs for fecal coliform for Accotink Creek, Blacks Run, and Christians Creek. EPA's rationale is based on the determination that the TMDLs meet the following eight regulatory conditions pursuant to 40 CFR §130.

1) The TMDLs are designed to implement applicable water quality standards.
2) The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.
3) The TMDLs consider the impacts of background pollutant contributions.
4) The TMDLs consider critical environmental conditions.
5) The TMDLs consider seasonal environmental variations.
6) The TMDLs include a margin of safety.
7) There is reasonable assurance that the TMDLs can be met.
8) The TMDLs have been subject to public participation.

II. Background

Accotink Creek, Blacks Run and Christians Creek are located in Fairfax, Rockingham, and Augusta counties respectively. The watersheds for Accotink Creek, Blacks Run and Christians Creek are 19,417 acres, 12,256 acres and 68,429 acres respectively. In Accotink Creek, low density residential (41.4%) and forest (38.9%) makeup 80% of the watershed. In Blacks Run, medium density residential (59.5%) and improved pasture (14.4%) makeup 74% of the watershed. In Christians Creek, improved pasture (47.3%) and forest (28.9%) makeup 76% of the watershed. The impaired segments of Accotink Creek, Blacks Run and Christians Creek are 4.5 miles, 10.7 miles and 31.52 miles respectively. The impaired segment of Accotink Creek begins at its confluence with Crook Branch and continues downstream to Lake Accotink. The Blacks Run segment begins at its

headwaters and continues downstream to its confluence with Cooks Creek. The Christian Creek segment begins at its headwaters and continues downstream to its confluence with Middle River. The watershed identification codes for Accotink Creek, Blacks Run and Christians Creek are VAN-A15R-02, VAV-B26R-01 and VAV-B14R-01 respectively.

In response to Section 303(d) of the CWA, the Virginia Department of Environmental Quality (VADEQ) listed all of the above mentioned segments as being impaired by elevated levels of fecal coliform on Virginia's 1998 Section 303(d) list. These segments were listed for violations of Virginia's fecal coliform bacteria water quality standard. The impaired segments of Blacks Run and Christians Creek were listed for failing to attain the state's general standard for aquatic life use based on evaluations of the benthic community. A separate TMDL has been developed to address this issue on Blacks Run. EPA is evaluating the data on Christians Creek to determine if listing is still warranted.

Fecal coliform is a bacterium which can be found within the intestinal tract of all warm blooded animals. Therefore, fecal coliform can be found in the fecal wastes of all warm blooded animals. Fecal coliform in itself is not a pathogenic organism. However, fecal coliform indicates the presence of fecal wastes and the potential for the existence of other pathogenic bacteria. The higher concentrations of fecal coliform indicate the elevated likelihood of increased pathogenic organisms.

EPA has been encouraging the states to use e-coli and enterococci as the indicator species instead of fecal coliform. A better correlation has been drawn between the concentrations of e-coli and enterococci, and the incidence of gastrointestinal illness. The Commonwealth plans on adopting the e-coli and enterococci standards in late 2002.

As Virginia designates all of its waters for primary contact, all waters must meet the current fecal coliform standard for primary contact. Virginia's standard applies to all streams designated as primary contact for all flows. Through the development of these and other similar TMDLs, it was discovered that natural conditions (wildlife contributions to the streams) could cause or contribute to violations of the fecal coliform standard. Thus, many of Virginia's TMDLs have called for some reduction in the amount of wildlife contributions to the impacted streams. EPA believes that a significant reduction in wildlife is not practical and will not be necessary due to the implementation plan discussed below.

A phased implementation plan will be developed for all streams in which the TMDL calls for reductions in wildlife. In Phase 1 of the implementation, the Commonwealth will begin implementing the reductions (other than wildlife) called for in the TMDL. In Phase 2, which can occur concurrently to Phase 1, the Commonwealth will consider addressing its standards to accommodate this natural loading condition. The Commonwealth has indicated that during Phase 2, it may develop a Use Attainability Analysis (UAA) for streams with wildlife reductions which are not used for frequent bathing. Depending upon the result of the UAA, it is possible that these streams could be designated for secondary contact. The Commonwealth will also investigate incorporating a natural background condition for the bacteriological indicator.

After the completion of Phase 1 of the implementation plan, the Commonwealth will monitor the stream to determine if the wildlife reductions are actually necessary, as the violation level associated with the wildlife loading may be smaller than the percent error of the model or fall within the MOS. In Phase 3, the Commonwealth will investigate the sampling data to determine if further load reductions are needed in order for these waters to attain standards. If the load reductions and/or the new application of standards allow the stream to attain standards, then no additional work is warranted. However, if standards are still not being attained after the implementation of Phases 1 and 2, further work and reductions will be warranted.

The impaired segments of Accotink Creek, Blacks Run and Christians Creek were given a high priority for TMDL development. Section 303(d) of the CWA and its implementing regulations require a TMDL to be developed for those waterbodies identified as impaired by the state where technology-based and other controls do not provide for the attainment of water quality standards. The TMDLs submitted by Virginia are designed to determine the acceptable load of fecal coliform which can be delivered to each of these impaired stream segments as demonstrated by the Hydrologic Simulation Program Fortran (HSPF)[1], in order to ensure that the applicable water quality standards are attained and maintained. HSPF is considered an appropriate model to analyze these watersheds because of its dynamic ability to simulate both watershed loading and receiving water quality over a wide range of conditions.

The TMDL analysis allocates the application/deposition of fecal coliform to land based and instream sources. For land based sources, the HSPF model accounts for the buildup and washoff of pollutants from these areas. Buildup (accumulation) refers to all of the complex spectrum of dry-weather processes that deposit or remove (die-off) pollutants between storms.[2] Washoff is the removal of fecal coliform which occurs as a result of runoff associated with storm events. These two processes allow the HSPF model to determine the amount of fecal coliform which is reaching the stream from land based sources. Point sources and wastes deposited directly to the stream were treated as direct

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[1]Bicknell, B.R., J.C. Imhoff, J.L. Little, and R.C. Johanson. 1993. Hydrologic Simulation Program-FORTRAN (HSPF): User's Manual for release 10.0. EPA 600/3-84-066. U.S. Environmental Protection Agency, Environmental Research Laboratory, Athens, GA.

[2]CH2MHILL, 2000. Fecal Coliform TMDL Development for Cedar, Hall, Byers, and Hutton Creeks Virginia,

deposits. These wastes do not need a transport mechanism to reach the stream. The allocations call for the reduction in fecal coliform wastes delivered by all instream and land applied sources.

Table 1 - Summarizes the Specific Elements of these TMDLs.

Segment	TMDL	WLA (cfu/yr	LA (cfu/yr)	MOS (cfu/yr)*
Accotink Creek	3.20E+15	0.13E+15**	2.91E+15	0.16E+15
Blacks Run	1.47E+14	5.52E+9	1.40E+14	0.07E+14
Christians Creek	1.46E+15	0.01E+15	1.38E+15	0.07E+15

* Virginia includes an explicit MOS by identifying the TMDL target as achieving the total fecal coliform water quality concentration of 190 cfu/100ml as opposed to the WQS of 200 cfu/ml. This can be viewed explicitly as a 5% MOS.
** The WLA is the summation of the loading from all current and future MS-4 facilities in the watershed.

EPA believes it is important to recognize the conceptual difference among the waste load allocation (WLA) values, load allocation (LA) values for sources modeled as direct deposition to stream segments, and LA values for flux sources of fecal coliform to land use categories. The WLA values and LA values for direct sources represent amounts of fecal coliform which are actually deposited into the stream segments. The HSPF model, which considers landscape processes which affect fecal coliform runoff from land uses, determines the amount of fecal coliform which reaches the stream segments. The LA in Table 1 is the amount of colony forming units (cfu) reaching the edge of stream from nonpoint sources annually. The WLA is given in the amount of cfu reaching the stream.

The United States Fish and Wildlife Service has been provided with copy of this TMDL.

III. Discussion of Regulatory Conditions

EPA finds that Virginia has provided sufficient information to meet all of the eight basic requirements for establishing the fecal coliform TMDLs for Accotink Creek, Blacks Run and Christians Creek. EPA is therefore approving these TMDLs. Our approval is outlined according to the regulatory requirements listed below.

1) The TMDL is designed to meet the applicable water quality standards.

Virginia has indicated that excessive levels of fecal coliform due to nonpoint sources (both wet weather and directly deposited nonpoint sources) have caused violations of the water quality standards and designated uses on Accotink Creek, Blacks Run and Christians Creek. The water quality criterion for fecal coliform is a geometric mean 200 cfu/100mL or an instantaneous standard of no more than 1,000 cfu/100ml. Two or more samples over a 30 day period are required for the geometric mean standard. Since the state rarely collects more than one sample over a thirty-day period, most of the

samples are measured against the instantaneous standard. The HSPF model provided the modelers with water quality samples at discrete time steps which enabled them to derive concentrations on at least a daily basis. Therefore, the TMDLs were designed to meet the geometric mean standard. The monitoring stations within Accotink Creek and Blacks Run had violation rates of 27% and 71% respectively in 1998. Christians Creek has two monitoring stations these stations had violation rates of 38% and 63%. The data for the 2000 assessment period indicated that the impairments are on going. It is important to note that these violations were based on the 1,000 cfu/100 mL instantaneous standard. Samples that were in accordance with this standard may still be above 200 cfu/100 mL, and thus, problematic for the attainment of the geometric mean. The geometric mean is designed to diminish the impact of a small number of extremely large samples on a data set. Therefore, the geometric mean is most impacted by the conditions that occur most often.

The HSPF model was used to determine the fecal coliform deposition rates to the land as well as loadings to the stream from point and other direct deposit sources necessary to support the fecal coliform water quality criterion and primary contact use. The following discussion is intended to describe how controls on the loading of fecal coliform to the impaired segments of Accotink Creek, Blacks Run and Christians Creek will ensure that the applicable criterion is attained.

The United States Geological Survey (USGS) collected bacterial source tracking (BST) data for all of these stream segments. The BST data was collected using a ribotyping technique. The analysis was performed on the e-coli bacteria found in the fecal matter. This analysis allows for the determination of the sources of fecal coliform to the stream segment. As the sampling set increases, the percent loading to the stream from each source can be determined more confidently. The dominant fecal coliform sources to Accotink Creek based on the BST data were geese (24%), humans (20%), and dogs (13%). The dominant sources for Blacks Run were cattle (29%), poultry (25%), and human (13%). The dominant sources for Christian Creek were poultry (25%), cattle (20%), and human (15%).

The TMDL modelers determined the fecal coliform production rates within the watershed. Information and data used in the models was obtained from a wide array of sources, including farm practices in the area, the amount and concentration of farm animals, point sources in the watershed, animal access to the stream, wildlife in the watershed, wildlife fecal production rates, land uses, weather, stream geometry, etc.. The model combined all the data to determine the hydrology and water quality of the stream. To determine the accumulation of fecal coliform on certain land uses by specific sources it is necessary to determine the amount of fecal wastes produced by the organism, the fecal coliform density within the wastes, the population of the organism in the watershed, and the habitat on which the organism resides. The modelers decided to hold the values of three of these parameters constant while adjusting the fourth parameter for modeling. It was decided that either the population or the fecal coliform density would be adjusted to insure consistency between the model and observed BST data. This was decided because it was felt that there was a greater variability associated with these parameters. In many instances the population was adjusted to match the simulated loadings to the

observed BST loadings. When this was done, the population values often had to be increased to levels we know may not be accurate. These population values are called effective populations.

Calibration is the process of comparing modeled data to observed data and making appropriate adjustments to model parameters to minimize the error between observed and simulated events.[3] The hydrologic portion of these models were calibrated to the USGS gages located within the watershed. The hydrologic models for Accotink Creek, Blacks Run and Christians Creek were calibrated to the following time periods respectively; October 1993 through September 1997, February 1999 through January 2001, and October 1993 through September of 1997. The time period for Blacks Run was much shorter since there was no continuous gage for the stream prior to TMDL development. The periods selected represent the hydrology over a wide range of weather patterns. Several parameters including the evapotranspiration rate, recession rates to groundwater and interflow, storage capacity within the subsurface and surface zones, slope, and forest cover were adjusted to insure that the calibration closely represented the observed data. The overall calibration fit the observed data within the established bounds for the time periods of the calibration.

In order to insure that the calibration was representing actual conditions properly, the model was transferred to a different time period and run without adjusting the hydrologic parameters. The hydrologic models for Accotink Creek and Christians Creek were validated against observed flow conditions from 1998 through 1999 and 1992 through 1993 respectively. Please refer to the USGS reports for a visual comparison of the observed versus simulated flow data.

EPA believes that using HSPF to model and allocate fecal coliform will ensure that the designated uses and water quality standards will be attained and maintained for the impaired segments of Accotink Creek, Blacks Run and Christians Creek.

2) The TMDL includes a total allowable load as well as individual waste load allocations and load allocations.

Total Allowable Loads

Virginia indicates that the total allowable loading of fecal coliform is the sum of the loads allocated to land based precipitation driven nonpoint source areas (residential, urban, forest, grassland, wetland, pasture, hayland, cropland, barren, and impervious areas), directly deposited nonpoint sources of fecal coliform (cattle in-stream), and point sources. Activities such as the application of manure and the direct deposition of wastes from grazing animals are considered fluxes to the land use categories.

[3]Maptech, 2002. Fecal Coliform TMDL Development for Catoctin Creek Impairments, Virginia. April 23, 2002.

The actual value for the total fecal load can be found in Table 1 of this document. The total allowable load is calculated on an annual basis due to the nature of the HSPF model.

Waste Load Allocations

Virginia identified several point sources discharging to these impaired stream segments. The point sources within each basin will be described separately. There was one permitted discharger identified as discharging fecal coliform to Accotink Creek. The permitted discharger was Fairfax County's Municipal Separate Stormwater System (MS-4). A MS-4 is permitted to discharge stormwater into a stream segment. These facilities can have hundreds of outfalls discharging stormwater runoff to the stream from their jurisdiction. Due to the nature of the source, storm events, these outfalls are expected to discharge sporadically with storm events. It should be mentioned that a sewer line may sometimes get crossed into a separate stormwater system inadvertently. Thus, discharging regardless of weather conditions.

The sporadic nature of the source and the diffuse nature of the discharge, makes it difficult to determine and measure compliance of such a facility with its WLA. Traditionally MS-4 permits have not incorporated an effluent limit. Instead, these facilities were given a set of best management practices (BMPs) to comply with. The TMDL has allocated a WLA for all stormwater related flows. This value was determined based on the amount of fecal coliform being discharged to the stream from urban and residential impervious areas that were underlain by the MS-4 system in the model. The city of Fairfax and the Town of Vienna will receive MS-4 permits in 2003. The TMDL provided a lump sum loading for all (current and proposed) of the MS-4 systems within the watershed. The TMDL specifically designates a WLA but requires implementation and measurement through BMPs.

There were two small point sources which were permitted to discharge fecal coliform within the impaired segment of Blacks Run. The two facilities are each permitted to discharge 200 cfu/ 100 mL of fecal coliform in their daily effluent flow of 1,000 gallons per day (gpd). Their WLA was the product of their fecal coliform concentration, flow and days of the year.

There were several facilities discharging to Christians Creek during the study period. However, a couple of the facilities diverted their effluent to an expanded facility and a new facility began discharging. There were five facilities and 12 single family home treatment plants discharging fecal coliform to Christians Creek. Single family treatment plants are permitted to discharge 1,000 gpd with a fecal coliform concentration of 200 cfu/ 100 mL. The WLA for these facilities is the product of the fecal coliform concentration, flow and days of the year. All of the individual facilities discharging to the impaired segment of Christians Creek were permitted to discharge fecal coliform at a concentration of 200 cfu/ 100 mL. It should be noted that due to treatment technologies associated with these facilities, with the exception of the MS-4 permits, discharge concentrations are expected to be much lower then their permitted effluent limits. Tables 2a and 2b list the facilities discharging to the Blacks Run and

Christians Creek watersheds and their WLA. The WLA for Accotink Creek can be found in Table 1 of this report.

EPA regulations require that an approvable TMDL include individual WLAs for each point source. According to 40 CFR 122.44(d)(1)(vii)(B), "Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA pursuant to 40 CFR 130.7." Furthermore, EPA has authority to object to the issuance of any National Pollutant Discharge Elimination System (NPDES) permit that is inconsistent with the WLAs established for that point source.

Table 2a - WLA for Blacks Run

Facility	Permit Number	Existing Load	Allocated Load
U.S. Training and Development Center	VAG401217	2.76E+9	2.76E+9
Single Family Home	VAG401944	2.76E+9	2.76E+9

Table 2b- WLA for Christians Creek

Facility	Permit Number	Design Flow (gpd)	Allocated Load
Augusta Co. Service Authority- Fishersville	VA0025291	4,000,000	11,085.7E+9
Augusta Co. Service Authority- Greenville	VA0090417	25,000	690.0E+9
Augusta Co. School Board	VA0020427	16,000	44.3E+9
Woodlawn Village L.L. Corp.	VA0089061	15,000	41.6E+9
Souther States Coop, Inc.	VA0086738	0	0
Single Family Home	VAG401655	1,000	2.76E+9
Single Family Home	VAG401967	1,000	2.76E+9

Single Family Home	VAG401968	1,000	2.76E+9
Single Family Home	VAG401082	1,000	2.76E+9
Single Family Home	VAG401138	1,000	2.76E+9
Single Family Home	VAG401159	1,000	2.76E+9
Facility	Permit Number	Design Flow (gpd)	Allocated Load
Single Family Home	VAG401195	1,000	2.76E+9
Single Family Home	VAG401203	1,000	2.76E+9
Single Family Home	VAG401443	1,000	2.76E+9
Single Family Home	VAG401449	1,000	2.76E+9
Single Family Home	VAG401869	1,000	2.76E+9
Single Family Home	VAG401969	1,000	2.76E+9
Total	N/A	N/A	11,895E+9

Load Allocations

According to Federal regulations at 40 CFR 130.2(g), LAs are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting loading. Wherever possible, natural and nonpoint source loads should be distinguished.

In order to accurately simulate landscape processes and nonpoint source loadings, VADEQ used the HSPF model to represent the Accotink Creek, Blacks Run, and Christians Creek watersheds. The HSPF model is a comprehensive modeling system for the simulation of watershed hydrology, point and nonpoint loadings, and receiving water quality for conventional pollutants and toxicants[4]. HSPF uses precipitation data for continuous and storm event simulation to determine total fecal loading to the impaired segments from residential, urban, forest, grassland, wetland, pasture, hayland, cropland, barren, and impervious areas. The total land loading of fecal coliform is the result of the application of manure and biosolids, direct deposition from cattle, other livestock, and wildlife (geese, deer, etc.), the deposition of fecal coliform from failed septic systems, and fecal coliform production from pets.

[4] Supra, footnote 2.

In addition, VADEQ recognizes the significant loading of fecal coliform from cattle in-stream. This source is not dependent on a transport mechanism to reach a surface waterbody, and therefore, can impact water quality during low and high flow events. These TMDLs modeled interflow (shallow subsurface flow) as containing a fecal coliform concentration of 1,500 cfu/ 100 mL. This assumption although backed by data was different than the assumption used by the Commonwealth in other TMDLs. Reductions seen in interflow mirror the reductions demanded for land applied loads. Therefore, a 75% reduction in cattle loading to a particular land surface would reduce the interflow component by a like amount. This assumption required that more stringent controls be applied to the fecal coliform loading to land surfaces. Additional information on the sources of fecal coliform to the impaired segments can be found in Appendix A of the fecal coliform TMDLs for Accotink Creek, Blacks Run and Christians Creek. Tables 3a through 3c document the land based nonpoint source loads and the loading from cattle in-stream. The land based nonpoint source loads are given in annual edge-of stream loadings.

Table 3a - LA for Accotink Creek

Land Use	Existing Load	Allocated Load	Percent Reduction
Residential	19.5E+15	2.04E+15	89%
Urban	5.12E+15	0.08E+15	98%
Forest	0.79E+15	0.65E+15	18%
Grassland	0.62E+15	0.10E+15	84%
Wetland	0.28E+15	0.04E+15	86%
Total	26.31E+15	2.91E+15	89%

Table 3b - LA for Blacks Run

Land Use	Existing Load	Allocated Load	Percent Reduction
Urban	3.88E+14	2.32E+13	94%
Residential	4.18E+14	6.55E+12	98%
Pasture	9.03E+14	5.60E+13	94%
Hayland	7.51E+14	4.06E+13	95%
Cropland	1.65E+14	1.17E+13	93%
Forest	1.42E+13	1.39E+12	90%
Barren	1.82E+11	1.14E+10	94%

Total	2.64E+15	1.39E+14	95%
Cattle In-Stream	2.96E+13	2.95E+11	99%

Table 3c- LA for Christians Creek

Land Use	Existing Load	Allocated Load	Percent Reduction
Urban	2.54E+15	1.01E+14	96%
Residential	10.1E+15	1.23E+14	99%
Pasture	11.5E+15	4.96E+14	96%
Cropland	7.05E+15	4.28E+14	94%
Hayland	4.17E+15	1.66E+14	96%
Forest	1.38E+15	0.58E+14	96%
Total	36.74E+15	1.37E+15	96%
Direct Deposition	0.14E+15	0.01E+14	99%

3) The TMDL considers the impacts of background pollution.

A background concentration was set by determining the wildlife loading to each land segment.

4) The TMDL considers critical environmental conditions.

According to the EPA regulation 40 CFR 130.7 (c)(1), TMDLs are required to take into account critical conditions for stream flow, loading, and water quality parameters. The intent of this requirement is to ensure that the water quality of Accotink Creek, Blacks Run and Christians Creek is protected during times when it is most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards[5]. Critical conditions are a combination of environmental

[5]EPA memorandum regarding EPA Actions to Support High Quality TMDLs from Robert H. Wayland III, Director, Office of Wetlands, Oceans, and Watersheds to the Regional Management

factors (e.g., flow, temperature, etc.), which have an acceptably low frequency of occurrence. In specifying critical conditions in the waterbody, an attempt is made to use a reasonable "worst-case" scenario condition. For example, stream analysis often uses a low-flow (7Q10) design condition because the ability of the waterbody to assimilate pollutants without exhibiting adverse impacts is at a minimum. These critical conditions ensure that water quality standards will be met for other than worst case scenarios.

The sources of bacteria for these stream segments were a mixture of dry and wet weather driven sources. Therefore, the critical condition for Accotink Creek, Blacks Run and Christians Creek was represented as a typical hydrologic year. Since these segments were modeled to attain the geometric mean standard, base and low flow events occurred far more often then wet weather events, it was essential that the standard be maintained during these periods.

5) The TMDLs consider seasonal environmental variations.

Seasonal variations involve changes in stream flow as a result of hydrologic and climatological patterns. In the continental United States, seasonally high flows normally occur in early spring from snow melt and spring rain, while seasonally low flows typically occur during the warmer summer and early fall drought periods. Consistent with our discussion regarding critical conditions, the HSPF model and TMDL analysis effectively considered seasonal environmental variations. The models also accounted for the seasonal variation in loading. Fecal coliform loads changed for many of the sources depending on the time of the year. For example, cattle spent more time in the stream in the summer and animals were confined for longer periods of time in the winter.

6) The TMDLs include a margin of safety.

This requirement is intended to add a level of safety to the modeling process to account for any uncertainty. The MOS may be implicit, built into the modeling process by using conservative modeling assumptions, or explicit, taken as a percentage of the WLA, LA, or TMDL.

Virginia has included an explicit MOS for these TMDLs by establishing the target water quality concentration for fecal coliform at 190 cfu/ 100mL, which is more stringent than Virginia's water quality standard of 200 cfu/100 mL. This would be considered an explicit 5% MOS.

Point sources were modeled as discharging at their permitted concentrations and flows. This was a conservative assumption because most sewage treatment plants discharge at concentrations far below their permitted level, thereby, providing additional assimilative capacity for the stream.

Division Directors, August 9, 1999.

7) There is a reasonable assurance that the TMDL can be met.

EPA requires that there be a reasonable assurance that the TMDL can be implemented. WLAs will be implemented through the NPDES permit process. According to 40 CFR 122.44(d)(1)(vii)(B), the effluent limitations for an NPDES permit must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA. Furthermore, EPA has authority to object to issuance of an NPDES permit that is inconsistent with WLAs established for that point source.

Nonpoint source controls to achieve LAs can be implemented through a number of existing programs such as Section 319 of the CWA, commonly referred to as the Nonpoint Source Program. Additionally, Virginia's Unified Watershed Assessment, an element of the Clean Water Action Plan, could provide assistance in implementing this TMDL.

The TMDLs in their current form are designed to meet the applicable water quality standards. However, the reductions needed to attain these standards are extreme. The Commonwealth intends to implement these TMDLs through BMPs. The implementation of these practices will occur in stages. This is will allow the Commonwealth to monitor the benefits of the BMPs and determine which practices have the greatest impacts on water quality. It will also provide a mechanism for developing public support and checking the accuracy of the model.

To address the wildlife issue that was previously mentioned, the Commonwealth believes that it may be appropriate to modify its current standards to address the problems associated with wildlife loadings.

8) The TMDLs have been subject to public participation.

Several public meetings were held to discuss TMDL development on these impaired segments. All of the public meetings were public noticed in the *Virginia Register* and opened to at least a 30 day comment period. For the Accotink Creek TMDL, the public meetings were held on October 28, 1999, March 01, 2000, January 25, 2001 and January 09, 2002. The first two meetings were held in the Robert Frost Middle School in Fairfax County. The third and fourth meetings were held in City Hall of Fairfax City. The public meetings for Blacks Run were held on August 30, 2000, May 10, 2001 and November 01, 2001. All of the meetings were held in VADEQ'S's regional office in Harrisonburg, VA. The public meetings for Christians Creek were held May 24, 2000, November 08, 2000 and November 02, 2001. All of the meetings were held in the Beam Annex Building in Fisherville, VA.